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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,575	08/18/2003	Philip Davis	84,726	6606

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COASTAL SYSTEMS STATION, DAHLGREN DIVISION
NAVAL SURFACE WARFARE CENTER
6703 W HWY 98
CODE CP2L
PANAMA CITY, FL 32407-7001

EXAMINER

FICK, ANTHONY D

ART UNIT	PAPER NUMBER
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1753

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/644,575

Applicant(s)

DAVIS, PHILIP

Examiner

Anthony Fick

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 12 recites the limitation "said phase change material" in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 8 through 11 and 13 through 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiller et al. (U.S. 6,914,343) in view of Koyanagi et al. (U.S. 5,430,322).

Hiller discloses a generator and method of generating power from environmental temperature cycles.

Regarding claim 1, figure 6A shows a power generator comprising a portion of a shell, fins and layer attached to fins, made from a thermally conductive material, said portion having an outer surface in contact with the surrounding fluid (air) environment

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and an inner surface opposing said outer surface not in contact with the surrounding environment, a plurality of thermoelectric converters, p and n blocks, electrically coupled together having a first surface and a second surface thermally coupled to the inner surface of the portion of the shell, and a phase change material, ice-water mixture, thermally coupled to each thermoelectric device that has a phase change temperature approximately the average of the upper and lower temperatures of the environment, wherein the thermoelectric devices generate electrical power as the generator transits through the environment (column 4, paragraph 1). It is the position of the examiner that the rotation of the planet, Earth or Mars, on which the device of Hiller sits, provides transit of the device through the environmental change of warm air to cold air.

Regarding claim 2, Hiller discloses bismuth telluride as a thermoelectric material (column 11, lines 55-57).

Regarding claims 8 and 9, Hiller discloses coupling thermoelectric elements in series or parallel (column 5, lines 8-10).

Regarding claim 10, the phase change material described in relation to claim 1 is also a thermal buffer that is thermally coupled to the thermoelectric elements.

Regarding claim 11, Hiller discloses bismuth telluride as a thermoelectric material (column 11, lines 55-57).

Regarding claims 13 and 14, Hiller discloses coupling thermoelectric elements in series or parallel (column 5, lines 8-10).

Regarding claim 15, Hiller discloses a method using the generator of figure 6A, the generator comprising a portion of a shell, fins and layer attached to fins, made from

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a thermally conductive material, said portion having an outer surface in contact with the surrounding fluid (air) environment and an inner surface opposing said outer surface not in contact with the surrounding environment, a plurality of thermoelectric converters, p and n blocks, electrically coupled together having a first surface and a second surface thermally coupled to the inner surface of the portion of the shell, and a phase change material, ice-water mixture, thermally coupled to each thermoelectric device that has a phase change temperature approximately the average of the upper and lower temperatures of the environment, wherein the thermoelectric devices generate electrical power as the generator is transiting through the environment (column 4, paragraph 1). It is the position of the examiner that the rotation of the planet, Earth or Mars, on which the device of Hiller sits, corresponds to transiting of the device through the environmental change of warm air to cold air.

Regarding claim 16, Hiller discloses leaving the devices on the surface of Mars for several decades (column 5, lines 5-7), thus the method continuously repeats the transiting (multiple rotations of the planet).

Regarding claim 17, Hiller discloses bismuth telluride as a thermoelectric material (column 11, lines 55-57).

The differences between Hiller and the claims are the requirements of the fluid environment to be water, and the device in contact with an underwater vessel.

Koyanagi teaches an ocean electric generation system that uses a temperature difference in seawater to produce electricity. The device in figure 4, flows cold water from a deep portion of the sea and warm water from the surface portion of the sea

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across thermoelectric elements to produce electricity from the temperature difference (column 8, lines 40-60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the ocean environmental temperature cycle to produce power as in Koyanagi with the device and method of Hiller because the device of Hiller is able to produce electricity for the majority of the temperature cycle without pumping fluid, and it is known in the art to produce electricity from the temperature cycle of the ocean as evidenced by Koyanagi. It would have been further obvious to one having ordinary skill in the art at the time the invention was made to utilize an underwater vessel to provide the transit for the method of Hiller because the only way to carry out the transit of Hiller in the underwater environment rather than the air environment is via an underwater vessel.

6. Claims 3, 4, 12 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiller in view of Koyanagi as applied to claims 1, 2, 8 through 11 and 13 through 17 above, and further in view of Roesner et al. (U.S.P.G.Pub 2003/0112603) and Pionetti (U.S.P.G.Pub 2004/0156684).

The disclosure of Hiller in view of Koyanagi is as stated above for claims 1, 2, 8 through 11 and 13 through 17.

The difference between Hiller in view of Koyanagi and the claims is the requirement of a specific phase change material.

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Roesner teaches a thermal interface comprising a phase change material such as paraffin wax that is thermally conductive (paragraph 0019). Pionetti teaches the use of paraffin within deep ocean pipelines.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize an appropriate phase change material for the ocean depths, such as paraffin wax, within the device and method of Hiller in view of Koyanagi because it is known in the art to be a phase change material that is able to be used at ocean depths (Roesner and Pionetti).

7. Claims 5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiller in view of Koyanagi as applied to claims 1, 2, 8 through 11 and 13 through 17 above, and further in view of Chao et al. (U.S. 4,448,028).

The disclosure of Hiller in view of Koyanagi is as stated above for claims 1, 2, 8 through 11 and 13 through 17.

The difference between Hiller in view of Koyanagi and the claims is the requirement of tubular structures containing the phase change material attached to the thermoelectric devices.

Chao teaches a thermoelectric system as shown in figure 2 that incorporates heat pipes in contact with the thermoelectric devices. The heat pipes are tubular passages filled with a phase change material to convey heat with the thermoelectric elements (column 4, last paragraph).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the tubular heat pipes filled with phase change material as

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in Chao, to contact the thermoelectric elements within Hiller in view of Koyanagi because the heat pipes provide a low cost, compact, efficient heat transfer system that has a longer life and is easier to clean and maintain than conventional systems (Chao column 5, paragraph 1). Because Hiller in view of Koyanagi and Chao are concerned with thermoelectric power generation, one would have a reasonable expectation of success from the combination. Thus the combination meets the claims.

8. Claims 6, 7, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiller in view of Koyanagi, further in view of Chao as applied to claims 5 and 19 above, and even further in view of Roesner et al. (U.S.P.G.Pub 2003/0112603) and Pionetti (U.S.P.G.Pub 2004/0156684).

The disclosure of Hiller in view of Koyanagi, further in view of Chao is as stated above for claims 5 and 19.

The difference between Hiller in view of Koyanagi, further in view of Chao and the claims is the requirement of a specific phase change material.

Roesner teaches a thermal interface comprising a phase change material such as paraffin wax that is thermally conductive (paragraph 0019). Pionetti teaches the use of paraffin within deep ocean pipelines.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize an appropriate phase change material for the ocean depths, such as paraffin wax, within the device and method of Hiller in view of Koyanagi, further in view of Chao because it is known in the art to be a phase change material that is able to be used at ocean depths (Roesner and Pionetti).


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Fick whose telephone number is (571) 272-6393. The examiner can normally be reached on Monday thru Friday 7 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anthony Fick *ADF*
AU 1753
December 21, 2006


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